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ASCB AWARD ESSAY

It's a Wonderful Life: A Career as an Academic Scientist

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Many years of training are required to obtain a job as an academic scientist. Is this investment of time and effort worthwhile? My answer is a resounding "yes." Academic scientists enjoy tremendous freedom in choosing their research and career path, experience unusual camaraderie in their lab, school, and international community, and can contribute to and enjoy being part of this historical era of biological discovery. In this essay, I further elaborate by listing my top ten reasons why an academic job is a desirable career for young people who are interested in the life sciences.

Students are attracted to careers in academic science because of their interest in the subject rather than for financial reward. But then they hear messages that make them think twice about this career choice. It is difficult to find a job: "Hear about Joe? Three publications as a postdoc and still no job offers." The NIH pay line is low: "Poor Patricia, she is now on her third submission of her first NIH grant." Publishing is painful: "Felix's grad school thesis work has been rejected by three journals!" Academic jobs are demanding: "Cathy has spent her last three weekends writing grants rather than being with her family."

Such scenarios do take place, but if you think that this is what a career in academic science is about, then you need to hear the other side of the story. And this is the purpose of this article—a chance to reflect on the many good things about the academic profession. In the classic movie *It's a Wonderful Life*, George Bailey is at the point of despair but regains his confidence through the wisdom and perspective of a guardian angel, Clarence. Doubt and setbacks also are bound to happen in science (as is true of other careers), but pessimism should not rule the day. It is a great profession and there are many happy endings. I would like to share my top ten reasons of why being an academic professor is a "wonderful life," one that bright and motivated young people should continue to aspire to pursue.

WHY I LOVE MY JOB: TOP TEN REASONS

Before I share my list of reasons, I should add a few disclaimers. First, I do not want to suggest that being an academic scientist (my job) is the "pinnacle of happiness"; it is hard work and not the right choice for everyone. There are many other career paths that are enriching and rewarding. Every profession has its own virtues, and each person should gravitate to a job that fits their own motivations and life style. The important point is finding passion in one's job, whatever it might be.

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As a second disclaimer, I am a senior scientist whose career has gone well so far. Some readers may say: "Vale is a successful, well-funded scientist; it is easy for him to be upbeat and positive." While success and job stability naturally contribute to positive thinking, there are broader reasons for optimism beyond my own personal situation. I also was just as happy doing biology as a student as I am now as a successful senior scientist. And success stories are not a thing of the past. I still see young people in my lab and elsewhere obtaining good jobs and being happy in their careers.

As a third disclaimer, not everything about my job is "fabulous" and not every day is "wonderful." Tedious assignments and some element of insecurity are unavoidable in any job. This article is an opportunity to celebrate the positives, which more than compensate for the negatives.

Now on to my top ten reasons why "I love my job." My remarks are mainly intended for younger scientists, who are anxious to know what awaits them and perhaps are searching for reasons why they should persevere through their training. The order of this list should not convey significance: reason 10 is not less important than 1. The list is not universal. My senior colleagues might identify with some of these points, disagree with others, and perhaps find some positives missing.

Reason 1: Freedom to Choose Your Directions

A big attraction and important component of a job as an academic scientist is to launch a research program. Unlike the case of jobs in hierarchal companies or organizations, projects are not dictated or handed down by a senior authority. Quite the opposite, an effective departmental chair or dean promotes independent thinking of its young faculty and does not tell them what to do. Thus, it is up to you to decide what research to perform and how to pursue it. Freedom to pursue your research also is protected by tenure, a rather unique type of intellectual and job protection offered in most academic institutions. This freedom to direct your own research program is great for some, but not desirable for all. It requires initiative and judgment, and there is no prescribed path to success.

Naturally, one's choice of research is not without constraints. Research requires money, and your proposed re-

search has to pass the scrutiny of grant agencies and their reviewers. However, the scope of fundable research is very broad, and in practice, one can wander quite a bit from the original aims of a funded grant proposal. In my opinion, scientists have greater freedom in picking projects that interest them than is true of most artistic professions. Being an artist, writer, photographer, or musician may appear to be a carefree and creative existence, but in reality, artists have to sell their works or services to pay the bills. My father was a successful author/screenwriter, but he sometimes had to craft his work according to what a producer or the public might desire. Thus, academic scientists are remarkably fortunate to be able to choose projects that satisfy their intellectual and creative cravings, while still having the security of stable monthly pay check.

Reason 2: Reinventing Oneself throughout One's Career

In an academic position, your work is constantly changing, mostly as a result of the nature of scientific research itself. Simply by "following one's nose," research projects constantly lead into new areas of biology, which jolts us occasionally out of our "comfort zone." The job is challenging and never dull; one is forced to think about new fields, and there are many opportunities to head off into new intellectual adventures. I find it appealing that my research program and ideas will change substantially in the coming decade. In contrast, many types of jobs change only in limited ways over a similar time span.

An academic position also allows one to reinvent oneself in more dramatic ways by shifting to new lines of work. Many academic professors start and end their careers as principal investigators running a research laboratory. However, some individuals may decide to leave the research track at some later stage of their career and pursue an administrative position; there is no shortage of such job opportunities for individuals with good organizational and people skills. Others may shift their focus from research to educational activities or decide to leave academics to take positions in industry or government. Thus, an academic professor can take many different career paths, as interests, priorities, and goals change over time.

However, new types of work also can be explored without leaving an academic position. For example, one can assume part-time roles in administration, industry, government, and education, or write a book, any of which can be pursued while still maintaining an academic position and running a lab (provided that one can juggle more than one ball in the air!). I have had the opportunity to serve as department chair, study section chair for a NIH review panel, scientific advisory board member for biotech companies and have taken on several educational initiatives. Each of these activities has been challenging and interesting. They have allowed me to explore new interests and develop skills without leaving my "day job." Indeed, these activities also have provided new perspectives that have complemented and aided my core responsibility of running a research laboratory.

Reason 3: Participating in the Great Era of Discovery

This is an exciting and historic time to be a biologist. All fields of biology are moving ahead at breakneck speed; we are developing a deep understanding of living organisms, from the complex molecular networks within cells to interactions between species in ecosystems. Our newly gained knowledge of living organisms is fascinating in its own right, but also has enormous practical implications for human health and global sustainability. Making scientific discovery (even if modest) is an exhilarating experience, knowing that one uncovered a piece of the puzzle. However, enjoyment of my job is not restricted to what is happening in my own laboratory. I feel fortunate to have received the training to *understand, appreciate, and enjoy* what is happening in the biological sciences overall. An important aspect of my job is to read papers and attend seminars or conferences. It is a pleasure to read an insightful paper or hear a beautiful talk. A wonderful aspect of the scientific profession is that one can enjoy and be inspired by work being done by others.

Reason 4: Being Part of an International Community Joined by Common Interests

Although my job is based in San Francisco, I feel connected to a global scientific community. Many of my close intellectual colleagues and friends reside in India, Japan, China, and Europe. Although we have been brought up in different cultures, we have much in common as the result of our shared experiences in the practice of science, our unifying passion for discovery, and the common language of how we seek truth and establish proof. Scientists working in different countries are connected through long-lasting intellectual bonds and not by corporate structures that hold individuals together one day and then might dissolve the next. We connect and self-organize through common interests, not through top-down–driven partnerships.

It is hard to match the scientific profession for its ability to foster international cooperation and collegiality. Realizing a vision of what a utopic world might become, members of various National Academies of Sciences or international scientific societies can transcend political, religious, and language barriers and talk easily to each other and set goals. I am proud to be part of a profession that is effectively working to bring the world together and improve quality of life. At a personal level, the international connections made through science and education are a very interesting and rewarding part of my job.

Reason 5: Pleasant Travels

Travel is associated with many professions, but often is viewed negatively rather than as a perk. For some professions, travel means preparing for high-pressure sales meetings or negotiations. Business class seats are provided to make the trip bearable. As an academic professor, travel is economy class but usually is enjoyable (and you can decide how much and where you travel). Delivering seminars is an important means of exchanging information and making contacts for collaborations. A seminar trip also is very rewarding and fun. During a seminar visit, you meet with various faculty and learn about their science, have lunch with students, and have a relaxing dinner with colleagues. A very pleasant way to spend a day! Scientists also travel to conferences to present their work and hear the latest results from others. These venues also provide opportunities to see old friends and make new ones. Sharing meals or a beer provides a venue for discussions of scientific nuances, new projects, collaborations, wild ideas, philosophy, and perhaps some gossip. Scientists come back energized from a good seminar trip or scientific meeting and usually bring back at least one new experimental idea or view of a problem that can significantly advance their research. Oh and yes, seminars or scientific meetings are often held in delightful cities.

Sabbaticals are another "perk" of an academic professorship, one that is found in very few other jobs (my friends in the business world are envious of such an opportunity). I have twice taken year-long sabbaticals. In 1994, I spent a year in Toshio Yanagida's laboratory in Osaka, Japan. Dur-

ing that year, I worked in the lab on an exciting project in which we visualized the movement of single fluorescently labeled kinesin molecules along microtubules, using new microscopy technologies developed that year by the Yanagida laboratory. I studied Japanese, visited as many temples in Kyoto as possible, and enjoyed the birth of my son. At the conclusion, I returned to San Francisco with a one-month-old baby for our home and single-molecule fluorescence imaging technologies for our lab. On my 2007–2008 sabbatical, I spent eight months in Bangalore, India, at the National Center for the Biological Sciences in the laboratory of Jitu Mayor, followed by three months at the ETH (Swiss Federal Institute of Technology), Zurich, with Ari Helenius. Both were fantastic scientific opportunities and great "life" experiences for our family. I have been actively engaged with India on several projects since I returned. My two sabbaticals fulfilled their intended purpose of generating new ideas and taking on new initiatives. They also seeded life-long friendships and led to new and deeper appreciations of different parts of the world.

Reason 6: A Social and "Youthful" Job

Many people imagine the "stereotypic scientist" as someone who performs experiments alone in the lab, deep in thought and surrounded by racks of test tubes. Rubbish! First of all, we rarely use test tubes these days. But more importantly, academic science is a very social endeavor. A good research laboratory not only produces results but also functions as a social glue, a second family. It is a nucleus for coffee breaks, birthday celebrations, parties, ski trips, dessert bake-offs, picnics, bike trips, and a whole host of other social interactions. A lab is a setting of close friendships and collegiality; this work environment has little or no hierarchy. It is a place where students, postdocs, and technicians cheer for each other's success and help one another to accomplish their experimental goals.

The department, the floor, and the building constitute larger beehives of interactions. Seminars, journal clubs, beer hours, and retreats bring laboratories together. Such social events are integral to the "business" of science, since people talk about their ideas or latest results as much as they talk about the latest movie. Interesting collaborations are spawned more often in these settings than in formal, scheduled meetings. Similar types of interactions occur at national or international venues. An idea for a new experiment might emerge through a conversation at the bar at a Gordon Conference or over dinner at the ASCB meeting. By-and-large, scientists enjoy working with one another, and ideas synergize through conversations. Quite often successful collaborations are based on intersections of compatible personalities as well as the underlying science. Although not taught in undergrad or grad school, the importance of the "human element" for scientific success cannot be underestimated. Quite fortunately, science is not the dry and impersonal occupation that some might envision.

I also enjoy academics because of its youthful character. By this I mean that the practice of science is driven predominantly by young people: undergraduates, graduate students, and postdocs who are doing the experiments in the lab. Academic professors are primarily coaches who train and advocate for the next generation. Instead of becoming more sequestered with senior colleagues as one climbs up a corporate ladder, my academic career will always be filled with the energy and spirit of young people who populate my laboratory. Trainees come and go, which also changes the character of a lab. In addition to being a fun environment, senior scientists learn a tremendous amount from their junior colleagues, who are often smarter and invariably more in touch with the modern practice of science.

Reason 7: Many Measures of "Success"

The academic profession can appear scary to trainees who feel that their future requires continual "high-profile" publications, running a big lab, and obtaining multiple grants. However, the pinnacle of scientific happiness is not necessarily running a lab of 15 people at UCSF. I am happy with this life, but this is not right for everyone. Fortunately, the profession accommodates many different styles and people can find their own niche. Also "success" should not be defined by the length of a CV, the sum of journal impact factors, or the "name recognition" of one's institution. Such kinds of success do not necessarily equate with happiness. I offer another metric of success, one that can achieved by anyone with a good heart and motivation and one that is not reserved for the subset of scientists who run big labs at highly ranked institutions. This metric is the impact that an individual makes at his/her institution and with his/her students and colleagues throughout the world. This type of success is cumulative over a career, much longer lived than most of our publications, what is recalled at a retirement party, and most importantly, the type of success that is the most personally rewarding.

Reason 8: Flexible Daily Schedule

Academic scientists are freed, to a large extent, from a rigid work hours. Arrival times are not dictated by the opening bell of the stock market, and lunch breaks need not end when the clock strikes one. I enjoy the flexibility of planning my day, week, month, and even my work environment (a coffee shop sometimes provides a more conducive setting for working on a manuscript than my office, where I will am bound to be interrupted).

However, do not get the wrong impression; flexibility in time does not mean little time working. Because scientific work is demanding and always open-ended, scientists tend to be workaholics rather than slouches. The work week of a scientist meanders into mornings, evenings, and weekends. "I'll be home in 30 minutes" usually means an hour. But if you want some time to relax or need to pick up the kids from school, you can arrange this. It is your time and you get to manage it, as long as you earn this flexibility by being responsible and productive.

As a further footnote on the flexibility of my work environment, I own vastly more T-shirts than ties.

Reason 9: Doing Some Good

Academic scientists tend to focus on problems and activities that they find interesting. No doubt, there is an element of self-indulgence. However, most academic scientists also are motivated by contributing to the common good. In rare cases, a discovery or new technology will translate directly to a new drug, device, or insight that improves human health, agriculture, or the environment. Even if these goals are not reached, the bulk of scientific work nevertheless builds our understanding of the world in which we live, which is necessary for future practical applications that we cannot foresee. Knowledge, either pure or sometime practical, is a good "product" and something that one can be proud of generating through a lifetime of work. Education and mentoring are other important contributions to society. Academic scientists can contribute at many levels, by part-time teaching of K-12 grades, instructing undergraduates or graduates, or communicating with the general public.

Reason 10: Scholarship

Academic institutions are founded on the precept of scholarship. I am evaluated on my ability to derive new knowledge, write scholarly papers, and teach. All represent continual challenges for learning and opportunities for self-improvement. Being a student at heart, it is irresistibly appealing to have a job that involves being part of a life-long "school."

As an academic scientist, it is a privilege to be supported by an enlightened society that is willing to support my scholarship and that understands that broad-based scholastic activity is the best path to societal improvement and industrial innovation. I also feel that it is my duty to uphold this privilege and contract with society by working diligently and in good faith in my academic occupation.

CONCLUSION

In summary, I consider myself fortunate to be able to say that "I love my job." Many people, sometimes in very lucrative professions, do not love their jobs and count the years or months until their retirement. I will retire someday, but I do not await that day as relief from a heavy burden. My job brings enjoyment, as does spending time with my family and friends, the outdoors, reading, and great meals. They all intermingle with one another to create a wonderful life, one that I do not have wait for retirement in order to enjoy.

And if you are young and feel passion for science and biology, enjoy what you are doing, filter out some of the pessimism that you might hear, and try not to stress out about the future. As George Bailey discovers in *It's a Wonderful Life*, there are happy endings, and there will be one for you. Perhaps we all need our own angel "Clarence" to pull us above our daily struggles and remind us to be hopeful and let us see how lucky we really are.

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